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A Research Note

EFFECT OF SMOKE UPON ACID PHOSPHATASE ACTIVITY OF SMOKED MEAT

INTRODUCTION

IN THIS COUNTRY and in some European laboratories, coagulation tests are being used to determine the maximum temperature attained in heat processing of hams and picnics. However, these tests present difficulties in interpretations and often give false results (Lind, 1965b; Olsman, 1968).

It has been suggested (Lind, 1965a; 1965b; Gantner et al., 1968; Olsman, 1968) that acid phosphatase activity may be used as a criterion for the heat treatment of hams and picnics. Although salt content (Lind, 1965b), polyphosphates (Körmendy et al., 1967) and pH (Körmendy et al. 1960) have been shown to affect the phosphatase activity, the effect that smoke exerts upon acid phosphatase activity is apparently unknown.

EXPERIMENTAL

Materials

Pork loin samples from the longissimus dorsi muscle were used in this study. The samples were deboned, most of the external fat removed, and sliced on a meat slicer to 1.1-cm thickness. The slices were divided randomly into 3 equal groups to obtain control, heated, and heated and smoked samples. The slices to be heated or heated and smoked were treated similarly in the smokehouse with the exception of smoke being added to the latter samples. The smokehouse temperature was 60°C and the relative humidity was 45%, resulting in an internal temperature of the meat of 58.8°C after 2.25 hr of treatment.

Acid phosphatase activity. 2 methods were used to determine the acid phosphatase activity of pork samples. The Andersch et al. (1947) method for the determination of serum acid phosphatase was adapted for determination of acid phosphatase activity in meat. A 10-g sample of meat was homogenized in 20 ml of 0.05 M phosphate buffer (pH 7.6) for 1 min. The resulting slurry was centrifuged at 25,000 × g for 30 min. The supernatant from the fresh sample was diluted 1 to 5 for analysis; the supernatant from the heated and smoked samples was not diluted. The remainder of the procedure was unchanged from the original method. A second method (Lind, 1965a), used in Europe as an indicator of the heat processing of hams, was also employed to determine acid phosphatase activity.

Nitrogen analysis

Nitrogen was determined by the micro-Kjeldahl method as described by the American Instrument Company (1961).

RESULTS & DISCUSSION

RESULTS obtained by 2 methods of determining acid phosphatase activity are given in Table 1. With either method, there was a significant decrease in the acid phosphatase activity of the heated and the heated and smoked samples. Although heat caused a definite decrease in acid phosphatase activity, and this decrease may be related to heating temperatures (Lind, 1965b; Olsman, 1968), it would appear from the above results that if smoke accompanies heating, the effect that smoke exerts upon acid phosphatase activity would also have to be taken into consideration if this test were used to measure heat treatment of smoked meats.

Table 1—Effect of heating and heating and smoking on the acid phosphatase activity of pork samples.[1]

	State of muscle		
	Untreated	Heated	Heated-smoked
nm moles Substrate hydrolyzed/min/mg N (Andersch et al., 1947)	7.12	0.56	0.24**
μmoles Phenol/g sample (Lind, 1965a)	7.75	1.19	0.39**

**$P < 0.01$.

[1]Smokehouse condition: 60°C (140°F), 45% R.H.

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